T. A. EDISON.

Electric-Lights.

No. 227,228. Patented May 4, 1880.

Fig. 1.

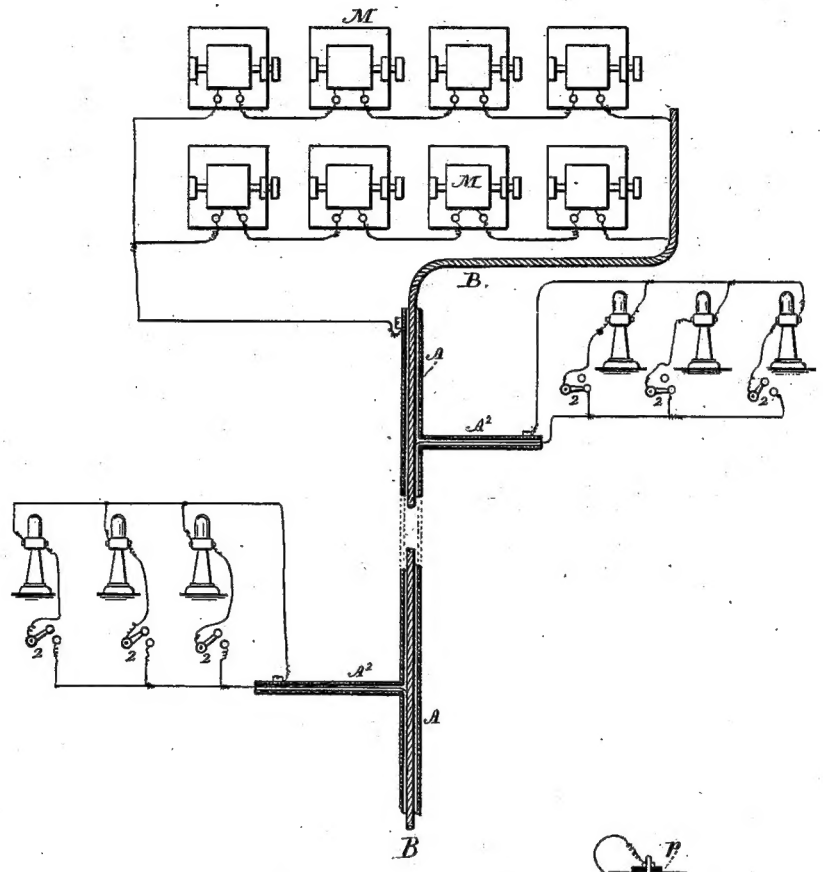
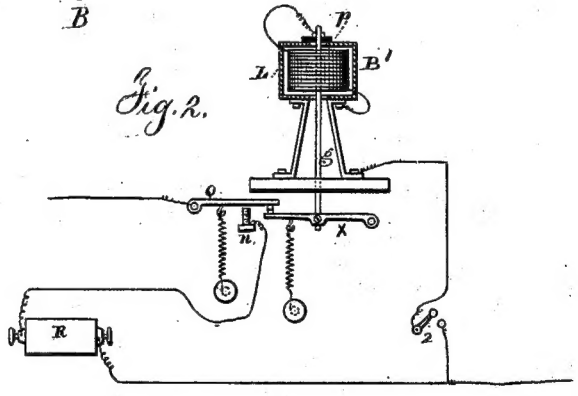


Fig. 2.



Witnesses

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

ELECTRIC LIGHT.

SPECIFICATION forming part of Letters Patent No. 227,228, dated May 4, 1880.

Application filed February 3, 1879.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented an Improvement in Electric Light, (Case No. 169,) of which the following is a specification.

In my Patents Nos. 214,636, 219,628, and 218,866 the expansion of metal under heat is availed of in regulating the electric circuit, and hence the same is disclaimed herein.

In my present electric lamp I make use of a coil of wire with a pyroinsulating material between the coils similar to that set forth in my application No. 166, which pyroinsulation is disclaimed herein; but I combine therewith a surrounding case that is rendered incandescent by the heat of the coil, and I combine with the lamp a thermal-circuit regulator arranged so that the amount of light can be varied at pleasure by an adjusting-screw that regulates the point at which the thermal regulator acts to open the electric circuit and lessen the current, so that the incandescent case can be more or less luminous.

The invention also consists in a lamp which is peculiarly adapted to use in multiple arc.

In the drawings, Figure 1 is a diagram illustrating the connections, and Fig. 2 shows the peculiar lighting apparatus.

The magneto-electric machines may be of any suitable character and driven by power. They may be arranged between the two main conductors A B in ranges or multiple arcs of three, four, or more in each, and the connections should be made for intensity. I have represented four such magneto-electric machines, M, in each range.

A is a tube laid in the earth, and preferably of iron, and it forms, together with the earth, one-half of the circuit. Within this tube is an insulated conductor, B, preferably of a number of strands of copper twisted together in the form of a cable, one strand of the cable being dropped, say, every one hundred feet, so that at the extreme end of the circuit there shall be but a single strand. This cable is insulated from the tube by any cheap or economical insulation, such as tar or asphaltum.

A branch tube, A^2, containing a single strand from the cable, is to enter each house or building, and from the basement smaller wires are run to the various parts of the house where the lights are required. Each lamp is to be provided with a switch, 2, so that it may be disconnected from the conducting-wires.

The electric generators at the central station are provided with constant field-of-force magnets, the helices of which are in the electric circuit; hence if all the lamps feeding from the main conductors are disconnected by their switches the circuit will be broken and no current passes through the conductors leading from the station to the lights, and the steam-engine runs lightly and with the expenditure of a very small amount of force. If now the switch of a single lamp is turned the lamp is connected to the branch wires from the main conductors, the circuit is closed, and only sufficient current passes from the central station to supply that lamp, because the external resistance determines the amount of current. In this way the current will be proportioned to the number of lamps in the circuit.

Each lamp I prefer to contain a resistance when incandescent of one thousand ohms. After the switch has been turned on so as to connect the light to the conductors the current will pass through a resistance, R, equal to the lamp; but if the thermal regulating-screw *n* be turned downward the lamp will be thrown in circuit and the current divided according to the extent to which the regulating-screw has been turned downward; if but slightly the lamp will only reach, say, a red heat, when, owing to the expansion of the regulating-rod *g*, the lamp will be thrown out of circuit and the resistance R thrown in, as the lever *x* allows the lever Q to come in contact with the point *n*, the lever *x* breaking contact with it simultaneously. As this takes place the lamp cools and the contraction of *g* places the lamp in circuit again. Thus the resistance of the lamp and its appurtenances is quite regular regardless of the degree of temperate or amount of light the lamp is giving out. This feature of this light is similar to that shown in my application No. 166, and therefore does not form part of the present invention.

This apparatus is not a perfect regulator, as the resistance of the incandescent conductor increases with its heat; but if in any case it is desirable that the resistance should be practi-

cally constant at all temperatures the screw *n* may be arranged to operate contact-levers, so as to decrease or increase the resistance of R when it is thrown upward or downward, several bobbins of wires being used in R, as in my application No. 146, one or more being brought into circuit by the movement of the screw *n* and its levers. By the means above described about nine-tenths of the resistance, except of the main conductors, is light-giving resistance, thus effecting great economy in current.

As before described, as the connecting of one or more lamps causes a sufficient amount of current to be developed at the central station to keep the same incandescent, it follows that if the machines at the station are arranged expressly for tension and quantity many hundreds of lamps may be placed in circuit between the main conductors, the reduction of resistance upon placing each lamp in the circuit drawing the proper quantity of current from the station; hence the greatest economy possible is obtained by causing all the resistance outside of the main conductors to be light-giving resistances.

The lamp shown in Fig. 2 consists of a bobbin of wire insulated with a pyroinsulator, such as zircon, magnesia, lime, or other compounds of high fusibility, as set forth in my application No. 166. This bobbin B′, which has preferably a resistance of one thousand ohms, is placed within a metallic case, L, which is rendered highly incandescent by the radiated heat from the bobbin. The rod *g* is insulated from the case at P, and one end of the bobbin B′ is connected by a wire to this rod, the other end of the bobbin being connected to the case L or to the wire connected to the switch 2. When the lamp is turned off the lever Q is in contact with *n* and the resistance R is in circuit; but when *n* is lowered until the lever Q comes into contact with *x* the lamp is thrown in circuit and the regulating-rod *g* allows more or less intimate contact between *n* and Q.

I will mention that the case L is not necessarily metallic, as it may be of lime or zircon.

I claim as my invention—

1. The lamp consisting of a pyroinsulated coiled wire, in combination with a surrounding case that is rendered incandescent by the radiated heat, substantially as set forth.

2. The combination, with the electric lamp, of the thermal regulator, a resistance, and an adjusting device, *n*, arranged and operating substantially as set forth.

Signed by me this 28th day of January, A. D. 1879.

THOMAS A. EDISON.

Witnesses:

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J. N. MACKENZIE.